IS 9401 (Part 20) : 2013

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भारतीय मानक

नदी घाटी परियोजनाओं में कार्य मापन की पद्धतियाँ (बांध और सम्बद्ध संरचनाएँ)

भाग 20 संरक्षण कार्य

Indian Standard

METHOD OF MEASUREMENT OF WORKS IN RIVER VALLEY PROJECTS (DAMS AND APPURTENANT STRUCTURES)

PART 20 PROTECTION WORKS

ICS 93.160

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Measurement and Cost Analysis of Works for River Valley Projects Sectional Committee, WRD 23

FOREWORD

This Indian Standard (Part 20) was adopted by the Bureau of Indian Standards, after the draft finalized by the Measurement and Cost Analysis of Works for River Valley Projects Sectional Committee had been approved by the Water Resource Division Council.

In the measurement of quantities, in the construction of river valley projects, a large diversity of methods exists at present according to local practices. Lack of uniformity creates complication regarding measurement and payments. This standard is intended to provide a uniform basis for measurement of various items of protection works carried out in river valley projects.

This standard is a Part of the series of Indian Standards formulated on the method of measurement of works in river valley projects (dams and appurtenant structures). The other parts in the series are:

(Part 1)	Excavation for foundation
(Part 2)	Dewatering
(Part 3)	Grouting
(Part 4)	Concrete work
(Part 5)	Masonry
(Part 6)	Ventilation pipes and other embedded materials
(Part 7)	Joints
(Part 8)	Instrumentation
(Part 9)	Lining
(Part 10)	Form work
(Part 11)	Diaphragm walls
(Part 12)	Topographical surveys
(Part 13)	Earth and fill dams
(Part 14)	Canal works
(Part 15)	Investigation works — drilling of bore holes and exploratory drifting and logging
(Part 16)	Tunneling
(Part 17)	Hydro-mechanical and related metal works
(Part 18)	Sheet piling
(Part 19)	Electro-mechanical works

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHOD OF MEASUREMENT OF WORKS IN RIVER VALLEY PROJECTS (DAMS AND APPURTENANT STRUCTURES)

PART 20 PROTECTION WORKS

1 SCOPE

This standard (Part 20) covers the methods for the measurement of protection works in terms of units of measurement for the works carried out in river valley projects.

2 REFERENCE

The standard given below contains provision which, through reference in this text, constitutes provision of this standard. At the time of publication, the editions indicated was valid. All standards are subject to revision and parties to agreements based on this standard is encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

IS No.	*Title*
9401(Part 2) : 2003	Method of measurement of works in river valley projects (dams and appurtenant structures): Part 2 Dewatering (*first revision*)

3 GENERAL

3.1 The purpose of measurement of proposed work is preparation of bill of quantities for estimating and tendering. The purpose of measurement of executed work is assessment of value of work for payment. In either case the method of measurement should be such that it is fairly quick, reasonably accurate and amenable to check at any time.

3.2 In case of measurement of proposed work, the dimensions are scaled or read from drawings and then processed, that is, reduced to length, area, volume or weight in recognized units of measurements for the particular item. In case of assessment of executed work, the dimensions are measured in the field. Calculations of length, area, volume, weight, etc, are made on the basis of these dimensions and payments are made accordingly. Where measurement of a number of units are the same it is the usual practice to take measurements of one unit and multiply the calculated length, area, volume or weight by the number of units.

3.3 Measurements shall be taken to nearest centimetre including that for the levels. Fractions less than half shall be disregarded and fractions half and above are to be regarded as unity. Areas shall be worked out to nearest 0.0l m^2 and cubic contents shall be worked out to nearest 0.01 m^3. However, in measurements of repetitive nature, this practice shall be applied to the total of the item and not to individual unit. It is essential that measurements shall be as accurate as possible.

3.4 Measurements are closely linked with detailed drawings, description of items and specifications of the work. These should, therefore, be very clear and properly worded and the order of precedence shall be sanctioned drawings, approved specifications and specified description of items.

3.5 Clubbing of Items

Items may be clubbed together provided the break-up for such items is agreed to be on the basis of the detailed description of items stated in this standard.

3.6 Bill of Quantities/Items of Work

Item of work shall provide short description of item (nomenclature) with unit, quantity and rate as per the technical specifications.

3.7 Detailed Description of Items

The description of items shall be as given in technical specifications.

3.8 Booking of Dimensions

In booking dimensions, order shall be consistent and generally in sequence of length, width and height or depth or thickness.

3.9 Measurements

All work shall be measured net in the decimal system, as fixed in place, unless otherwise stated herein, as given below:

a) Linear dimensions shall be measured to the nearest 0.01 m;
b) Weight shall be worked out to the nearest 0.01 kg;
c) Areas shall be worked out to the nearest 0.01 m^2;

d) Cubic contents shall be worked out to nearest 0.01 m^3; and

e) Any work done extra over the specified dimensions shall be ignored.

3.10 Works to be Measured Separately

Works executed in following conditions shall be measured separately:

a) Work in or under water;

b) Work in liquid mud;

c) Work in or under foul positions;

d) Work under tides; and

e) Work in snow.

3.11 Wherever, springs or special situations are encountered and dewatering is resorted to, it shall be measured in accordance with IS 9401 (Part 2).

4 MEASUREMENT OF IRREGULAR AREAS AND VOLUMES

4.1 Irregular areas shall be divided into a number of figures of known area, say, triangles, rectangles, etc. The remaining part (which cannot be formed into a triangle or a regular figure) shall be evaluated on common basis by Simpsons rule, or average ordinate rule.

4.2 In case of an irregular volume the volume shall be determined by Prismoidal formula.

5 MEASUREMENT

5.1 Rock Paving

Measurement shall be of the volume of rock paving, placed to the lines and thicknesses shown on the construction drawings. The actual surface area to compute the volume would be determined by field measurements.

5.2 Gabions/Wire Crates

5.2.1 Measurement shall be made separately for wire crates and for filling with boulders.

5.2.2 Measurement for the wire crates shall be of the area of the crates placed *in-situ*.

5.2.3 Measurement for the filling with boulders shall be of the volume of placed gabions including filling of voids with sprawls. No deduction shall be made for voids.

5.3 Wet Random Rubble Masonry Wall

5.3.1 Measurement for the wet masonry walls shall be of the volume of the walls, placed to the lines and thicknesses shown on the construction drawings.

5.3.2 Foundation excavation, blinding concrete and weepholes shall be measured separately.

5.4 Dry Random Rubble Masonry Wall

Measurement for dry random rubble masonry walls shall be of the volume of the masonry placed.

5.5 Grass Turf

Measurement of the grass turf shall be of the area actually sodded as per the specification.

5.6 Shotcrete

5.6.1 Measurement for shotcrete shall be of the volume of shotcrete placed.

5.6.2 The measurement area of shotcrete for surface excavation works to compute the volume shall be the projected area over the plane parallel to plane of average excavation

5.6.3 For areas other than surface excavations relevant Indian Standards may be referred.

5.7 Chain Link Fabric

Measurement for chain link fabric shall be of the net area (without overlaps) actually installed including fittings and fixtures.

5.8 Wire Mesh

Measurement for wire mesh shall be of the net area, in square metre (without overlaps), actually installed including all fittings/fixtures.

5.9 Rock Bolt/Rock Anchor

Measurement for rock bolt/rock anchor of various diameters and length of reinforcing element installed including the length of threaded portion projecting beyond rock surface shall be measured in kg. Extensions whether welded or threaded shall also be measured in kg.

5.10 Post-Tensioned Rock Bolts (Tendons)

5.10.1 Measurement for the supply and installation of post-tensioned rock bolts shall be of the total length in linear metre of rock bolts installed, measured from the outer face of head to far end of the strands/wires.

5.10.2 No extra payment shall be made for the testing equipment for performing the suitability tests, simple and comprehensive stressing tests and for plotting and submitting the stressing records. Load cells used for comprehensive monitoring shall however be measured separately in numbers.

5.11 Drainage Work

5.11.1 Measurement for drilling of drainage holes shall be of the length of holes actually drilled in positions, irrespective of the location, inclination or direction of the hole.

5.11.2 Measurements of PVC pipe (both perforated and non-perforated) where installed in the drainage holes shall be of the length of pipe so installed.

5.11.3 Measurement for the supply and installation of drain hole outlet devices shall be of the number of outlets installed.

5.11.4 Where re-drilling of the previously drilled drainage holes is required after an additional grouting, measurement shall be of the actual length of re-drilled hole. Measurement for this length in linear metre shall be made in the form of an additional payment over and above that made for the original drilling at the rate of 50 per cent of the appropriate unit price.

5.12 Geotextile/Geomembrane

5.12.1 Measurement for payment for geotextile/geomembrane shall be of the net area in square metre (without overlaps) actually installed.

5.12.2 Measurement shall be made at the unit price per square metre entered in the schedule, which shall include the entire cost of supply and installation of geotextile/geomembrane, including overlaps, and the provision of all necessary accessories for fixing, such as steel pins and extra plates and nuts for fastening to rock reinforcement.

5.13 Bamboo Palasiding

Measurement for bamboo palasiding shall be in running meter of two rows of bamboo of 75 mm diameter actually driven in the ground at least 90 cm below the ground and at least 90 cm above ground and fixing of half bamboo of three rows horizontally including fitting fixing with cane or tying wire complete and providing brushwood or sand/earth filled gunny/high-density polyethylene (HDPE) bags in the spur.

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Amendments Issued Since Publication

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